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AUTHOR Spencer, Richard E.; Seguin, Edmond L.
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ABSTRACT

An experiment, using College Board Achievement Tests in German Reading and Listening Comprehension, to compare the effectiveness of earphones and loudspeakers in language test presentation is described. Related opinions, implications, and conclusions on the effectiveness of communication media in language teaching and testing are offered. (AF)

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The Relative Effectiveness of Earphones and Loudspeakers as a Means of Presenting a Listening Test in a Foreign Language

RICHARD E. SPENCER AND EDMOND L. SEGUIN, *The Pennsylvania State University*

COMMERICAL language laboratories rely predominantly upon the use of earphones through which stimulus material is presented. The oral portion of the language is learned in accordance with the auditory capabilities and manifestations of the earphone. It is possible that the individual nature of the earphone contributes to the high cost of language laboratories. If it can be shown that earphones are either logically or linguistically unnecessary, great economy in the development of laboratories can be realized. Secondly, if earphones create auditory discrimination learning which is not matched by language behavior in real life, their use may be to the detriment of the language student.

Although listening comprehension tests have been developed and standarized for use with large groups of students, the language laboratories are restricted to the number of students who may fit into the individual laboratory stations at any one time. Scheduling arrangements can usually be made to allow for ample laboratory work for as many students as need be; but listening examinations, because of the factor of security, must usually be administered concurrently. Therefore, it is practically impossible to administer a listening test simultaneously to all language students if earphones are to be used. Thus, the tests have been standardized with the use of a tape recorder, with auditory discriminations based on the capabilities of the loudspeaker. There is, then, a difference between the language laboratory presentation of the language and the testing. This research project was designed to test for the extent of this difference.

The Department of German at The Pennsylvania State University has been conducting a four year descriptive analysis of the effectiveness of German language instruction.[1] Since all students in the first four levels of German were required to take both a reading and listening comprehension test[2] as part of this analysis, it was decided to use this opportunity to conduct a test of the effectiveness of the use of earphones versus loudspeakers for the administration of the listening test.

The purpose of this study was to determine if two different methods of presenting a German foreign language listening test (earphones vs. loudspeaker) has an effect on the scores of the students. Specifically, do student scores differ as a result of the method of presentation of a listening comprehension test when the audio stimulus is presented through earphones or through a loudspeaker?

[1] Richard E. Spencer, *A Descriptive Study of the First Four Level German Language Courses at The Pennsylvania State University*, Research Report #01. University Division of Instructional Services, The Pennsylvania State University, 1961. Richard E. Spencer, L. Pinto, and E. L. Seguin, *German Language Learning Project, Report #2*, Research Report #09, University Division of Instructional Services, The Pennsylvania State University, Feb., 1963.

[2] Educational Testing Service. "College Board Achievement Tests in German, Reading Comprehension (CPL-1) and Listening Comprehension (DLC-1)" Princeton, New Jersey.

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The first administration of the listening tests took place at the end of the 1962 winter term. Students had registered complaints concerning the quality of the sound on the taped German Listening Test, indicating that perhaps their performance was affected by inadequate auditory discrimination levels. For the initial administration of the tests the audio portion of a closed-circuit television system was used to present (1) the standardized directions for both the reading and the listening tests and (2) the listening test in its entirety. Both the directions and the listening test were taped and were fed into television receivers located in several classrooms, 20 to 30 students in each room.

In addition to student complaints, several other factors prompted this study. The language laboratory at The Pennsylvania State University is equipped with individual headsets, so that students are able to concentrate during listening practice with minimal distraction and maximum auditory control. The primary consideration in connection with the language laboratory, however, is that students are required to spend two one-half hour periods per week listening with headsets to German dialogue and conversation. Does the use of these headsets in the *learning* setting contribute significantly to performance when the *testing* situation employs loudspeakers? More specifically, will those students who learn on headsets and are tested on headsets perform better on the criterion tests than those students who learn on headsets and are tested by loudspeakers?

In at least one study of student attitudes on the relative merit of headsets vs. loudspeakers, the comparative quality of audio reproduction was in question. Attitudes were surveyed on an *ad hoc* basis after students in a music appreciation course had been subjected to both earphone and loudspeaker listening procedures. In the discussion of their findings the authors made the following statement:

> One point of ambiguity was the reproductive quality of the two methods. Some felt the earphones were superior; some the loudspeakers; and still others found no difference.[3]

Evidence favoring the use of headsets is offered by Wojnowski, who states:

> The use of headsets offers the following distinct advantages over listening to the teacher or tape recorder alone: (1) The experience is more personal; pupils believe the master voice is talking to them alone. (2) Headsets cut out other sounds; pupils do not hear their neighbors repeating; attention is much better, for each person is doing his own work. (3) Most important of all, each syllable is clearly heard. It is amazing how much is not heard at all in the usual classroom. In the study of a foreign language where each child is struggling to speak correctly, he certainly should have the opportunity to hear correctly and entirely what he is striving to repeat.[4]

The subjects for this experiment were 66 undergraduate students enrolled in German 3 for the winter term, 1963. Twenty-eight of these students were randomly selected to form the experimental (earphone) group. The remaining students formed the control (loudspeaker) group.

The College Board Placement Tests for German Reading Comprehension (Form KPL-1) and German Listening Comprehension (Form DLC-1) were used as criterion measures. Obtained split-half reliability coefficients are presented in Table 1.

TABLE 1

	Earphone Group		Loudspeaker Group	
	r	r corr	r	r corr
German Reading Comprehension	.871	.931	.869	.945
German Listening Comprehension	.855	.922	.840	.895

The equipment used is as follows:

1. The earphones consisted of 28 sets of Clevite-Brush "Crystal Headsets" with a frequency response of 100–5,000 cps. The sensitivity of these headsets is 6.3 dynes/cm²/volt at 100 cps. Each headset was equipped with an individual volume control.

2. The loudspeaker was housed in a conventional television receiver. The physical proper-

[3] Frank Simon, and L. P. Greenhill, "A Study of the Acceptability of Emphasis in a Televised Course of Music Appreciation," Research Report #12, University Division of Instructional Services, The Pennsylvania State University, April, 1963.

[4] Margaret V. Wojnowski, "Emphasis on Understanding and Speaking: The Foreign Language Laboratory. Modern Languages in the High School." U. S. Department of Health, Education and Welfare, Office of Education, Report #08-27005, 1958, p. 68.

ties of the sound emanating from the loudspeaker were not determined. There was one loudspeaker in the control group room at the front of the room.

3. The audio-portion of a closed-circuit television system was used to broadcast the stimulus materials to both headsets and loudspeaker simultaneously.

Both student groups were seated in typical classrooms. For the experimental group, each set of earphones was equipped with a volume control and students were directed to adjust the volume to a comfortable level. The volume control on the loudspeaker was adjusted to a level where all subjects in the control group reported adequate volume. Volume control was accomplished during the instruction part of the test administration.

The instructions for both tests and the German Listening Comprehension Test were recorded on audio-tape and presented simultaneously to both groups. The instructions were prepared in accordance with the standardized administration procedures published by the Educational Testing Service, Princeton, New Jersey. Both groups were tested at the same time.

It was possible that the general academic ability of the two groups of students was different enough, in spite of the randomization process, to generate differences in performance on the criterion measure. In order to test for the effects of academic ability, grade point averages for the students were collected for use as a controlling variable in an analysis of covariance test of the difference between the two groups. Prior to application of the covariance model, a test of the relationship between grade-point averages and Listening Test results produced nonsignificant correlations, thus grade-point averages were abandoned as an adjusting variable.

TABLE 2

PRODUCT-MOMENT CORRELATIONS BETWEEN GERMAN READING AND LISTENING TEST RESULTS FOR THE EARPHONE AND LOUDSPEAKER GROUPS

	r	N
Earphones	.830	28
Loudspeaker	.810	38

Further efforts to reduce error and isolate treatment effects proved more fruitful. Product-moment correlations were computed between reading and listening for both groups. These correlations are presented in Table 2.

A test of the significance of the difference between correlation (r to z transformation) indicated that the two correlations are not significantly different. The relationships between German reading and listening for both groups were nearly identical. The magnitude of the independent correlations also justified the use of reading scores as a controlling variable in the covariance design. An analysis of covariance was conducted to assess differences between listening scores controlling on reading comprehension scores. Table 3 presents observed and adjusted means for both groups.

TABLE 3

OBSERVED AND ADJUSTED MEANS ON THE GERMAN LISTENING COMPREHENSION TEST

	N	German Reading Comprehension	German Listening Comprehension	
			Observed	Adjusted
Earphones	28	43.32	25.75	24.77
Loudspeaker	38	40.05	21.26	22.03

Routine tests of significance of regression, homogeneity of regression, and homogeneity of variance indicated that the assumptions of the covariance model were satisfied. Summary data for this analysis is presented in Table 4.

TABLE 4

ANALYSIS OF COVARIANCE RESULTS FOR THE GERMAN LISTENING COMPREHENSION TEST CONTROLLING ON GERMAN READING COMPREHENSION TEST RESULTS

Source	SS	d.f.	V	F	p
Treatments	120.92	1	120.92	3.71	.10>p>.05
Error	2085.53	64	32.59		
Total	2206.45	65			

The F-ratio of 3.71 (1,64 d.f.) indicates no significant difference at the .05 level, but does indicate significance beyond the .10 level.

In general, the results show that the performance on the listening test for the earphone group was somewhat superior to the perform-

ance on the same test by the loudspeaker group, despite the fact that the obtained F-ratio failed to reach the conventional .05 level. This situation is not as paradoxical as it may seem. The purpose of the generalization is to call attention to the differences in performance by both groups on the reading test in comparison to their differences in performance on the listening test. Taken independently, one can safely state that no significant effects on performance in reading resulted from group differences ($t=.839$; $p<.40$). The critical issue, however, cannot be resolved as readily as this. Certainly something in the treatment is operative, when the obtained F-ratio for the listening test approximates the .07 level. To disregard this finding for the sake of convention would be to lose potentially useful results.

One interesting aspect of this study which bears mentioning is the lack of rigorous control on the physical properties of sound. The intention here was to approximate as closely as possible the actual classroom conditions. This was essential since the norming of the College Board tests on a local basis will necessarily reflect the conditions of the administration situtation.

This last factor raises the question of the utility of the findings of this study. What implications are there for learning? For testing?

An earlier factor analytic study by the authors indicated that the skills involved in language learning, specifically in German reading and German listening, are not independent dimensions.[5] It would seem, in light of the differential performance shown in the present study, that serious consideration should be given to the communication media in which a foreign language is taught and tested. For example, what is involved in language learning in the loudspeaker situation? If there is an appreciable loss in the acuity of sound, does this call for more effort on the part of the learner? Are the cues which are essential to the discrimination of foreign utterances hidden by inadequate equipment? Or, if supplementary effort is required to produce the desired discriminations will the additional cues enhance performance when the testing situation is adequate? The latter question becomes important when the efficiency of a particular type of instruction is in doubt. For example, if test performances are comparable when students learn under different situations, is it desirable or even necessary to require the learning of additional cues?

One conclusion which can be drawn here is evident. There is a need for concerted effort on the part of researchers in the field of language learning to identify those factors which contribute to successful mastery of a foreign language. The relevance of this discussion to the present study rests on the notion that the media selected for teaching, testing, or both might be one such factor.

[5] Spencer, Pinto, and Seguin, *op. cit.*

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